CLAIMS

1. A locking anti-motion suspension circuit for a work vehicle having a chassis, a control arm pivotally coupled to the chassis and a ground-engaging wheel coupled to the control arm, the vehicle including at least one hydraulic cylinder that is coupled to and between the control arm and the chassis to control the position of the wheel with respect to the chassis, the circuit comprising:

a gas-charged accumulator selectively connectable to said cylinder to absorb vehicular shocks by receiving hydraulic fluid ejected from said cylinder during travel over the ground;

a first hydraulic valve controllable to selectively connect said cylinder and said accumulator;

a hydraulic tank for receiving exhausted hydraulic fluid;

a hydraulic pump configured to provide a supply of pressurized hydraulic fluid; and

a second hydraulic valve fluidly coupled to and between said tank and pump and said accumulator to, said second valve being responsive to fluid pressure in said cylinder and fluid pressure in said accumulator to maintain said fluid pressure in said accumulator equal to said fluid pressure in said cylinder.

2. The suspension circuit of claim 1, further comprising a third hydraulic valve coupled to and between said tank and pump and said cylinder, said third valve being operable to selectively raise said chassis by filling said cylinder from said pump, to lower said chassis by emptying said cylinder to said tank.

3. The suspension circuit of claim 2, wherein said first valve is configured to simultaneously connect said accumulator to said second valve and disconnect said accumulator from said cylinder and to simultaneously connect said accumulator to said cylinder and to disconnect said accumulator from said second valve.

4. The suspension circuit of claim 3, wherein said third valve is configured (1) to connect said pump to said cylinder when said first valve has disconnected said accumulator from said cylinder, and (2) to connect said pump to both said cylinder and said accumulator when said first valve has connected said cylinder and said accumulator.

5. The suspension circuit of claim 4, wherein said second valve is pilot operated by hydraulic signals transmitted from said cylinder and by hydraulic signals transmitted from said accumulator, and further wherein said second valve couples said accumulator to said pump when said accumulator pressure is lower than said cylinder pressure, and wherein said second valve connects said accumulator to said tank when said accumulator pressure is higher than said cylinder pressure.

6. The suspension circuit of claim 5, wherein said first valve effectively locks said cylinder when it disconnects said accumulator from said cylinder.

7. The suspension circuit of claim 6, wherein said first valve is manually operable to lock said cylinder and release said cylinder by manually moving a valve element of said first valve from a first position in which flow between said cylinder and said accumulator is blocked and flow between said cylinder and said accumulator is permitted.

8. A suspension for a skid steer vehicle having a chassis, comprising:

a control arm pivotally coupled to the chassis;

a ground-engaging wheel coupled to the control arm; and

a locking anti-motion hydraulic circuit, said circuit comprising:

a hydraulic suspension cylinder coupled to and between the control arm and the chassis to control the position of the wheel with respect to the chassis;

a gas-charged accumulator in fluid communication with said cylinder to absorb vehicular shocks and provide suspension springing;

a lock/suspend hydraulic valve manually controllable to connect said cylinder and said accumulator;

a hydraulic tank for receiving exhausted hydraulic fluid;

a hydraulic pump configured to provide a supply of pressurized hydraulic fluid; and

a pressure equalization hydraulic valve fluidly coupled to and between said tank and pump and said accumulator to regulate the flow of hydraulic fluid to and from said accumulator, said second valve being responsive

to fluid pressure in said cylinder and in said accumulator to maintain fluid pressure in said accumulator equal to fluid pressure in said cylinder.

9. The suspension of claim 8, further comprising a raise/hold/lower hydraulic valve coupled to and between said tank and pump and said cylinder, said raise/hold/lower valve being operable to selectively raise said chassis by filling said cylinder from said pump and to lower said chassis by emptying said cylinder to said tank.

10. The suspension of claim 9, wherein said lock/suspend valve is configured (1) to simultaneously make a connection between said accumulator to said pressure equalization valve and disconnect said accumulator from said cylinder and (2) to simultaneously connect said accumulator to said cylinder and to break a connection between said accumulator and said pressure equalization valve.

11. The suspension of claim 10, wherein said raise/hold/lower valve is configured (1) to connect said pump to said cylinder when said lock/suspend valve has disconnected said accumulator from said cylinder, and (2) to connect said pump to both said cylinder and said accumulator when said lock/suspend valve has connected said cylinder and said accumulator.

12. The suspension of claim 11, wherein said pressure equalization valve is pilot operated by hydraulic signals transmitted from said cylinder and by hydraulic

signals transmitted from said accumulator, and further wherein said pressure equalization valve couples said accumulator to said pump when said accumulator pressure is lower than said cylinder pressure, and wherein said pressure equalization valve connects said accumulator to said tank when said accumulator pressure is higher than said cylinder pressure.

13. The suspension of claim 12, wherein said lock/suspend valve effectively locks said cylinder when it disconnects said accumulator from said cylinder.

14. The suspension of claim 13, wherein said lock/suspend valve is manually operable to lock said cylinder and release said cylinder by manually moving a valve element of said lock/suspend valve from a first position in which flow between said cylinder and said accumulator is blocked and flow between said cylinder and said accumulator is permitted.

15. A method for controlling a suspension of a skid steer vehicle, the suspension including at least one control arm pivotally attached to a chassis of the vehicle, a hydraulic cylinder coupled to and between the control arm and the chassis, and a gas-charged accumulator in fluid communication with the hydraulic cylinder to provide springing for the control arm, the method comprising the steps of:

connecting the cylinder to the accumulator to suspend the control arm;

traveling to a loading location;

disconnecting the cylinder from the accumulator to lock the control arm in a fixed pivotal position with respect to the chassis;

changing the load on the vehicle such that the hydraulic fluid pressure changes in the cylinder; and

automatically and continuously adjusting the accumulator pressure to match the cylinder pressure as the load on the vehicle changes to maintain the vehicle chassis at the same height after loading.

16. The method of claim 15, further comprising the step of automatically and continuously comparing the accumulator pressure to the cylinder pressure as the load on the vehicle changes.

17. The method of claim 16, wherein the step of automatically and continuously comparing includes the steps of:

applying a cylinder pressure signal to a pressure equalization valve;

applying an accumulator pressure signal to the pressure equalization valve in opposition to the cylinder pressure; and

moving the pressure equalization valve in response to a difference between the applied cylinder pressure signal and the applied accumulator pressure signal.

18. The method of claim 17, wherein the step of automatically and continuously adjusting includes the step of dumping the accumulator to tank

when the accumulator pressure signal is greater than the cylinder pressure signal, and filling the accumulator when the accumulator pressure signal is lower than the cylinder pressure signal.

19. The method of claim 18, wherein the step of disconnecting the cylinder includes the step of simultaneously making a connection between the accumulator and the pressure equalization valve while disconnecting the cylinder from the accumulator.

20. The method of claim 19, further comprising the steps of simultaneously connecting the cylinder to the accumulator and breaking a connection between the accumulator and the pressure equalization valve while maintaining the vehicle chassis at the same height it was at before loading.